CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Fresh water is the fundamental life source on earth because water are basic elements that influence the quality of civilized life. Nowadays, fresh water was getting polluted and decreasing continuously because of the industrial development, intensified agriculture, improvement of standard of life and increase of the world population (Haruna, et al., 2014). In future, human may depend on oceanic and brackish water resources for fulfilling our demand of water (Ali, et al., 2012).

In the last 40 years, the problem of freshwater shortage has been one of the main challenges in the world. According to Alkan, P.I., 2003, only about 3% of the world water is potable and this amount is not evenly distributed on earth and more than 80 countries, which between them have 40% of the world's population, are being suffered from this problem. Thus, over one billion people each year are exposed to unsafe drinking-water due to poor source water quality and lack of adequate water treatment (Haruna, et al., 2014). This results in 900 million cases of diarrhea each year (Radwan, 2009).

Other than that, the supply of drinking water is one of the major problems in developing countries as well as under developing countries. Clean or potable water is a basic human necessity and without water life will be impossible (Panchal, 2012). The beginning and extension of humanity is based on water. Although more than 75% of the earth covered with water, only 0.014% can be used directly for the human being and other organisms. On the other hand, sea water constitutes 97.5% of global water, also can be used after treated as distilled water (Kabeel, et al., 2014).

Scarcity of fresh water in large cities around the world have enhanced as the pollution in rivers and lakes have occurred. The main reason of the scarcity is the impact of industrial and sewage disposal. However, with an increasing population and rapid growth of industrialization, there is a great demand of fresh water, especially for drinking purposes (Omara, et al., 2011).

One of the method to solve water problem is water purification by using solar water distillation system. A single basin solar still is a simple solar device used for converting brackish or waste water into potable water. The interest in the solar still system (Figure 1) has been used due to its simple design, construction, and low operating and maintenance costs, mainly in remote areas far from an electricity supply grid (Zurigat, & Abu-Arabi, 2004). However, its low productivity stimulated the development of methods to increase its efficiency. The solar distillation systems are mainly classified into two categories; i.e. passive and active solar stills. Solar radiation is the only parameter which affects evaporation in passive solar still while in active solar still, the additional device such as fan, pump, sun tracking system or solar collectors are added (Kabeel, et al., 2014).

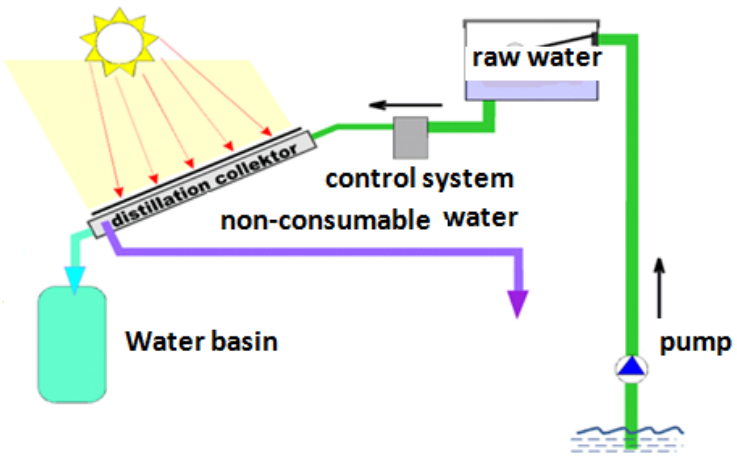

Figure 2-0: Solar Water Distillation System

The fundamental of solar water distillation are simple, yet effective, as distillation imitates the way nature purifies water as it utilize the energy of the sun as for heating the water to the point of evaporation. As the water evaporates, it vaporizes and condense on the glass surface for accumulation. This process removes impurities such as salts and heavy metals, and additionally destroys microbiological organisms (Al-Hayeka, & Badran, 2004). As a result, the water that been distilled is cleaner than the purest rainwater.

1.2 Motivation

The consumption of fresh water is increasing due to the increasing population and rapid industrial growth, which causing a serious depletion of fresh water. Hence, human being should start to depend on the brackish water for the source of water. One of the method to produce fresh water from brackish water is using solar distillation where the use of solar energy is utilized. However, one of the greatest challenge of a solar still is to increase its efficiency.

Numerous design and factor are considered to create a system that can produce the most efficient solar still which will be used to distillate brackish water to fresh water. Thus, the goal for this experiment is to efficiently produce clean drinkable water from solar energy conversion.

1.3 Problem Statement

The freshwater resources crisis and the need for water supplies are already critical in the whole world. Fresh water is the most important element for the human body to stay healthy and energetic. Water and energy are basic elements that affect the quality of human life (Haruna, et al., 2014). However, the production of clean water throughout the country have decreased. More than 900 million cases of diarrhea occurred every year worldwide (Rijab et al., 2001). Studies have shown that 0.5% of people exposed to unsafe water may die due to bacteria found in water that has been contaminated and 0.25% of people can die from dehydration caused by diarrhea.

In this study, seawater has been used as the main element for the success of the study. The sea water was used because it is readily available and it is a constant source of water. Sea water is usually found as a reliable solution in dry areas to meet the growing demand for water due to population growth, and economic and social development and also to reduce dependence on groundwater resources (R. Poblete, et al., 2016). In order to overcome the shortage of freshwater nowadays, a solar still that produce highest efficiency in converting brackish water to pure water must be proposed. Solar still also a process which is simple, yet effective because it uses solar energy for water heating to the point of evaporation.